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CITATION:

TABUSE, KATSUYOSHI ...[et al]. Microwave Tissue Coagulation in Partial Splenectomy for Non-parasitic Splenic Cyst. 日本外科宝函 1981, 50(5): 711-717

ISSUE DATE:

1981-09-01

URL:

http://hdl.handle.net/2433/208551

Arch Jpn Chir 50(5), 711～717, Sept., 1981

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Microwave Tissue Coagulation in Partial Splenectomy for Non-parasitic Splenic Cyst

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Received for Publication, July 13, 1981.

Summary

A 57-year-old female patient with splenic cyst was subjected to partial splenectomy, in which a microwave tissue coagulator devised by the authors was used with a satisfactory result. In effect, the use of this device led to a perfect hemostatic effect and made it feasible to minimize the resected portion of the spleen. In this way, it was shown to serve for preserving the normal splenic parenchyma. With the aid of our tissue coagulation method, partial splenectomy can be performed simply and safely without foreseeable troubles.

Introduction

Splenic syct rarely leads to splenomegaly and it is usually detected by chance for lack of clinical manifestations. Generally, total splenectomy has been performed in cases of splenic cyst. However, in view of the fact that serious infections including sepsis as postoperative complications occur very often[7], primary attention has recently come to be attached to preserving splenic functions as far as possible[2,3,14]. With the recent advance in the technique of operation on the parenchymal organs, reports of partial splenectomized cases with the spleen kept more or less functioning have begun to appear in these days. This report describes the case in which we succeeded in partial splenectomy including a splenic cyst, causing neither postoperative bleeding nor practical loss of normal splenic functions by utilizing a microwave tissue coagulator, an experimental model, devised by TABUSE[18].

Key words: Microwave tisseu coagulation, Partial sienectomy, Splenic cyst.
索引語：マイクロ波組織凝固法，脾部分切除術，脾嚢腫.
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Apparatus We used a microtron oscillator, model MT-7P (Heiwa Electron Co.) with a maximum output of 150 watts, which produces microwaves with a frequency of 2,450 MHz. A monopolar antenna is connected to the coaxial cable.

Case report 1

A 57-year-old woman consulted her physician for intermittent pain in the epigastrium and the left upper quadrant of the abdomen. She had no past history of ventral traumas. There

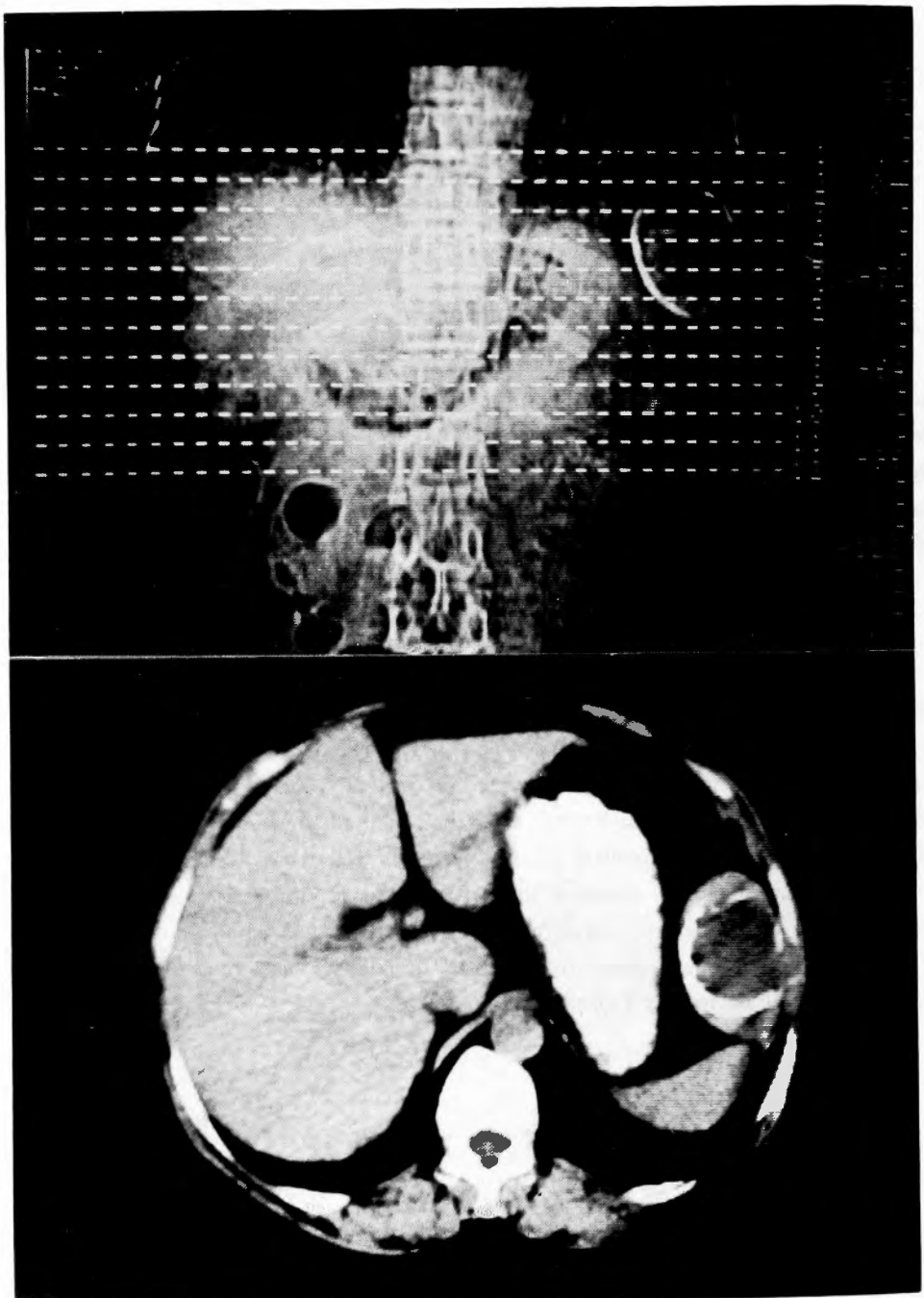

Fig. 1. Computed tomogram. Seen at the portion corresponding to the lower pole of the spleen is a low density tumor shadow zoned by a high density area.

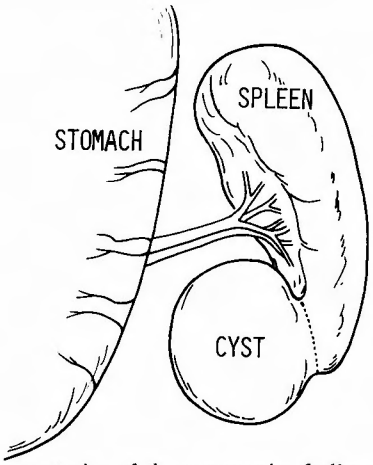

Fig. 2. Schematic presentation of the preoperative findings. A cyst sized 7×4.5×3 c n is viewed at the lower pole of the spleen.

was nothing else to remark at the initial consultation. Abdominal X-rays disclased a 5×5 cm sized, round mass with calcification, CT scan (Fig. 1) and echography were performed to establish the diagnosis of splenic cyst. On physical examination, the spleen was not palpated, nor was there any abnormality. Because of the persistent epigastralgia, surgery was performed on 15th December, 1980.

Operative findings

A 5 cm rounded cyst with patchy calcification of the entire wall was found, occupying the

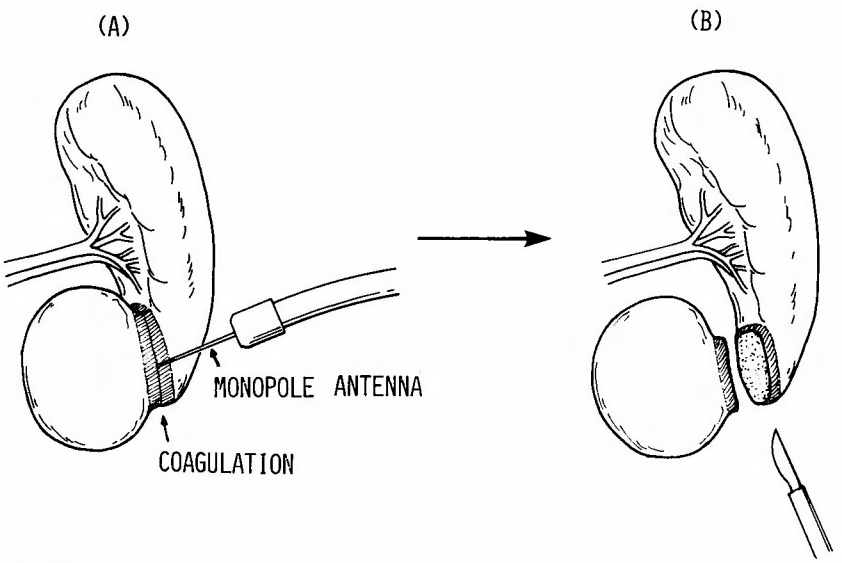

Fig. 3 (A, B). Operative procedures. The bank-like zone between normal splenic tissues and a splenic cyst is coagulated by inserting monopolar antennas at the three points indicated in (A), then is dissected, as shown in (B), to excise the cyst.

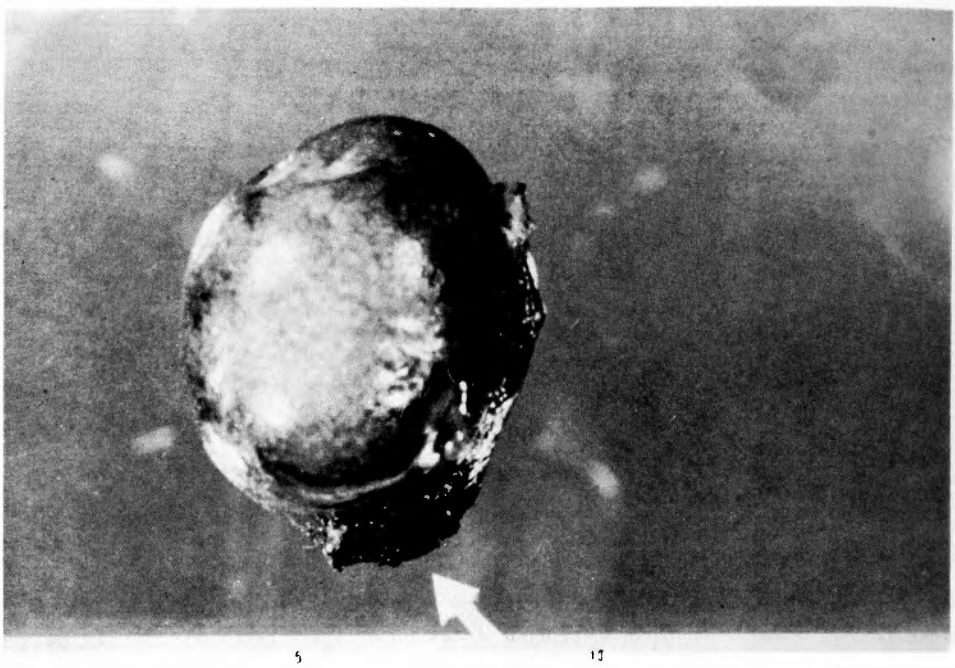

Fig. 4. A cyst weighing 90 g. The arrow shows the coagulated stump.

lower pole aspect of the spleen (Fig. 2). The cyst was partially intrasplenic. Careful dissection from the lower pole segmental vessels made it possible to remove the cyst intactly, with the 1 cm rim of normal splenic parenchyma overlying its most lateral portions. Parenchymal hemostasis was obtained with the microwave tissue coagulator. As illustrated in Fig. 3, the monopolar antenna was inserted into splenic tissues. The output of 50 watts and the irradiation time of 60 seconds were considered suitable for coagulation of splenic parenchyma. The interspace of approximately 1 cm in width between the cyst and the normal parenchyma was coagulated under these irradiation conditions. The region thus coagulated was sharply dissected along its center line. In this method, no practical bleeding was caused in spite of the fact that hemostatic ligation of blood vessels was not done and, in addition, the spleen was kept in situ without the necessity of transposition during operation. This, the whole operative procedures were carried out safely. A roughly 5 per cent of the splenic parenchyma had been resected with the cyst. The penrose drain was inserted in the region of the remaining spleen for 24 hours. No postoperative bleeding occurred. Her recovery was uneventful and she was discharged from the hospital on the fifteenth postoperative day. No original symptoms have recurred since then. The pathologic diagnosis was intrasplenic cyst with mural calcification. No epithelial lining could be identified (Figs. 4, 5).

Comment

The physical function of the spleen has not yet been fully characterized. It seems, however, that the non-specific immunological function in a wide sense of the term deteriorates following

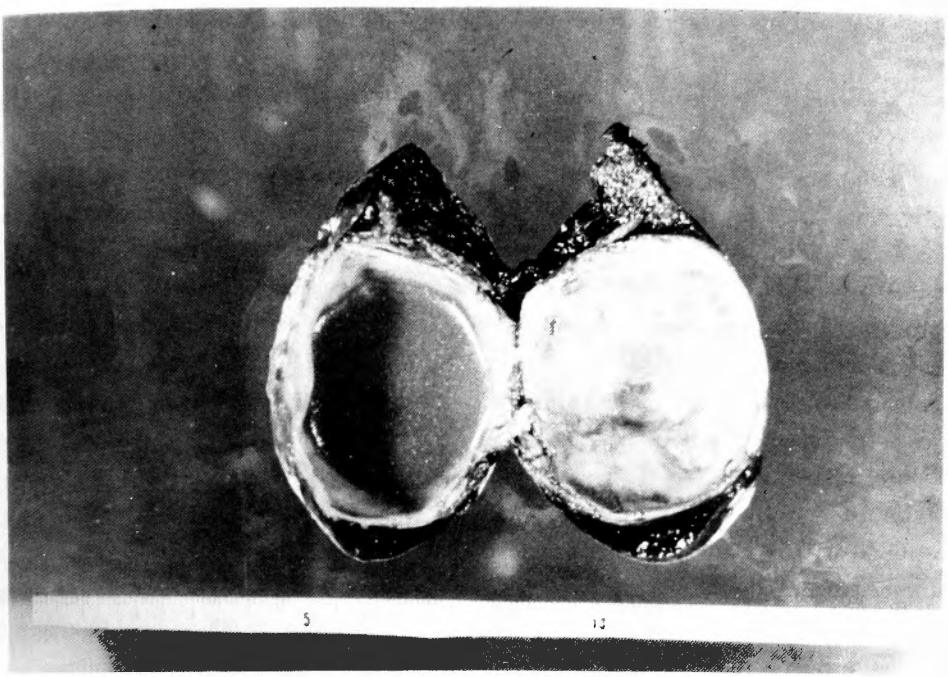

Fig. 5. A globular cyst of 4.5 cm in diameter. Its wall was as hard as a bone and had a thickness of 3 mm. The cyst contained a yellow-colored fluid and was surrounded by normal splenic tissues.

splenectomy. We have to be prudent to avoid splenectomy as far as possible and even in case it is unavoidable, it is preferable to have the organ kept functioning at least in part. The postoperative morbidities in patients splenectomized for splenic injuries were 44% and 38.9% accoreing to FABRI et al.[7] and DANFORTH and THORBJARNARSON[3], respectively. CIOFFIRO et al.[2] reported that the morbidity of postsplenectomy complications including persistent febrile condition was as high as 71%. ROGER et al.[14] described that the morbidity was 36% in patients who underwent splenectomy for iatrogenic splenic injuries induced during the Nissen fundoplication, while it was apparently lower (12,5%) in those who were subjected to the Nissen operation but not to splenectomy. They concluded that the morbidity may be heightened by splenectomy. Following up 2,795 splenectomized child patients, WIESEWETTER[20] demonstrated that the incidence of sepsis was 4.24% (119/2,795) and the mortality from sepsis was 2.52%. ERAKRIS et al.[6] reported that 8.1% of splenectomized infants at or below four years of age died from sepsis. HORAN et al.[8] stated that severe sepsis developed in a half of splenectomized babies aged 12 months or less, warning that splenectomy may be fatal to such immature patients. SINGER et al.[15] reported that the mortality from sepsis was 0.58% in 688 cases which had undergone splenectomy for splenic injuries. STRAUCH et al.[17] claimed that since infections develop very often in splenectomized patients, the spleen should be preserved as far as possible.

In the meantime, SIRINEK[16] reported that persons in their teens to thirties are most susceptible to non-parasitic splenic cyst. Referring to the statistical data presented by DIMARZIO[5] one

may find that patients with epidermoid cysts show an age distribution between 6 months to 50 years with a peak in the teens, and that their susceptibility to the disease does not differ between sexes. What are pointed out as compression symptoms involving the adjacent organs due to the growth of a splenic cyst are postprandial discomfort, anorexia, constipation and left upper abdominal fullness. Coughing, dyspnea, chest pain and shoulder pain are known as cardiopulmonary symptoms. Besides those cited above, there may occur, if rarely, acute type complications such as hemorrhage, infection and rupture[9,14]. As splenic systs involve relatively young people, efforts should be made to preserve normal splenic tissues to avoid the weakening of the defense power against infection after splenectomy, whether it is performed in the form of elective or emergency surgery.

Attempts to preserve the spleen, which were initiated as early as in the nineteenth century, have been continued up to now. PEAN et al.[12] were the first who performed incision or partial resection of the spleen. Reportedly, they failed to stop bleeding. Since then, improvements have been made in hemostatic methods[1,12]. Using cyanoacrylate monomer, L MORGENSTERM successfully performed subtotal splenectomy in a myeloid metaplasia case[10]. At a later date, he succeeded in partial splenectomy in four cases of splenic cyst by use of a microfibrillar collagen hemostat[11]. Furthermore, the use of metallic staples, gel-form patch or liquid nitrogen (for freezehemostasis) was reported to be effective on stopping bleeding due to splenic injuries.

As already introduced by TABUSE[18], our technique was first tried in experimental hepatic surgery utilizing rabbits. In this system, a coagulation layer of 10 mm in thickness is provided and hemostasis can be attained against bleeding from vessles with the maximum diameter of 3 mm As evidenced by time-course histological examination, necrotic tissues of the coagulated region are replaced by connective tissues gradually during a period of three to six months. Thus, the hemostatic performance of this technique is perfect. It is characterized by simplicity and safety which ensure a satisfactory result. It may well be recommended as a quite useful means of bloodless resection of parenchymal organs. The usefulness of this method has been confrmed in man as well. In fact, it was applied to our cases which needed treatment for spontaneous rupture of hepatoma[19], and further to those which were hepatectomized. In the present study, the technique was used in partial splenectomy for the first time. The postoperative course of the patient concerned was favorable without hemorrhagic episodes. The present findings suggest that microwave tissue coagulation may be of great value for hemostasis at partial splenectomy for not only splenic cyst but also splenic injury and, furthermore, may be an effective counter measure against bleeding due to splenic laceration, eliminating the necessity of splenectomy.

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和文抄録

マイクロ波組織凝固法による脾部分切除術
—脾嚢腫に対する臨床応用—

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田伏　克惇，勝見　正治

我々が開発したマイクロ波組織凝固装置を用い，57才女性の脾嚢腫に対し，partial splenectomy を行ない，術後経過良好であることを報告した．

このマイクロ波による脾組織の部分凝固止血法は，必要最少限の脾の部分切除あるいは止血が，安全，確実，簡単に行ない得，さらに脾損傷に対しても，脾臓の温存に役立つことを述べた．